

MAR 1952 01-40

CLASSIFICATION RESTRICTEDSECURITY INFORMATION
CENTRAL INTELLIGENCE AGENCYINFORMATION FROM
FOREIGN DOCUMENTS OR RADIO BROADCASTS

REPORT

CD NO.

STAT

COUNTRY China

DATE OF
INFORMATION 1950 - 1951

SUBJECT Economic - Forestry

DATE DIST. /2 Nov 1953

HOW
PUBLISHED Monograph

NO. OF PAGES 7

WHERE
PUBLISHED PeipingDATE
PUBLISHED 1 Oct 1952SUPPLEMENT TO
REPORT NO.

LANGUAGE Chinese

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SOURCE Chung-kuo Lin-yeh Ts'ung-lun Wen-chi, (A Collection of Essays on For-
estry in China), published by the China Forestry Editorial Committee,

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AFFORESTATION IN CHINA: 1951 RESULTS AND FUTURE PLANS

[Comment and Summary: This report consists of extracts from Sec-
tion II, pp 143-238, of the monograph Chung-kuo Lin-yeh Tsung-lun Wen-
chi (A Collection of Essays on Forestry in China), prepared by the
China Forestry Editorial Committee of the Central People's Government
and printed by a government printing office.

The material includes reports on the general afforestation pro-
gram of the nation, designed to protect watersheds of the principal
rivers from erosion and on afforestation belts in various areas for
protection against desert and coastal winds and tideswaters. It des-
cribes in some detail certain of these projects.]

Reafforestation Office's General Report for 1951

The February /1952/ National Forestry Conference decided to promote water-
shed afforestation along the Yellow River, the Huai Ho, and the Yung-ting Ho,
where flooding has been particularly severe. Watershed afforestation was also
decided on for North China, the Northwest, and for eastern Honan, where sand
drift is serious. It was further decided to strengthen the leadership of pri-
vate economy in forestry south of the Yangtze and to improve methods of exploi-
tation.

Watershed afforestation is also to be carried on in Chahar, Hopeh, East
China, and Central and South China in connection with the basic control programs.
on the Yung-ting Ho and Huai Ho. The watershed areas along the Lao-ha Ho in
Jehol, the Hun Ho in Liaotung, the Sungari River in Kirin, the Han Shui in Hupeh,
the Yuan Chiang in Hunan, the Kan Chiang in Kiangsi, and the Han Chiang in Kwang-
tung are all key points in the afforestation program. Planning has been done and
work carried out in a number of these areas. Surveys in progress on the headwa-
ters of the Yellow River, and afforestation has begun in the valley of the Ching-
wei Ho.

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Protective antiwind and antisand forestry belts are being developed or planned in the Northeast, eastern Honan, and the Northwest. The Honan program should be completed in 4 years.

In the Yangtze Valley, considerable progress is being made with such economically valuable crops as tung, pine, and fir. Sealing off mountain areas for afforestation is proceeding well, particularly in Hopeh and Shensi provinces and in the Northeast and Northwest.

Presently available statistics from all areas except Inner Mongolia and Pingyuan reveal the following nationwide results for three quarters of 1951:

<u>Area</u>	<u>Amount</u>	<u>Annual Goal (%)</u>
Afforested Area	6,940,060 mou	236
Nursery Area	54,289 mou	110
Seeds Planted	15,542,061 catties	467
Spot Planting	216,426,205 trees	73
Forest Areas Sealed Off	12,654,166 mou	162

Afforestation goals and achievements for 1951 were distributed as follows:

<u>Area</u>	<u>Afforestation Goal (mou)</u>	<u>Achievement (mou)</u>	<u>Survival of Planted Trees (%)</u>
Nation	2,942,144	6,890,079	65
Northeast	720,000	1,966,020	60
Inner Mongolia	18,987		
North China	639,732	1,036,337	62
Northwest	57,615	91,691	62
East China	267,000	981,941	72
Central and South	711,800	1,942,000	62.7
Southwest	527,010	922,080	70

The figures on percentage of survival are admittedly not entirely reliable, and the national average of 65 percent is probably higher than the actual result.

Report of the North China Spring Afforestation Summary Conference

1. Situation With Regard to Completion of the Spring Requirements

North China (five provinces), Shantung, and Honan planted 151,130,224 trees in the spring quarter of 1952. This was 54 percent of the entire accomplishment for all of 1950. Pingyuan, Chahar, and Shansi equaled the 1950 total accomplishment. Seeds were planted on 50,455 mou in North China, about 9 percent of the year's goal of 543,500 mou.

2. Problem of the Direction in the Afforestation Program

In China, there are 4,300,000,000 shih mou (one shih mou equals 0.1647 acre) of waste land. To afforest this area at the 1950 rate would require over 2,500 years. Hence, it is apparent that only an over-all mass effort, thoroughly organized and ably led, can successfully cope with this situation.

Methods of afforestation cooperative programs in various areas require careful study and revision. The stipulations regarding shares and profits must be clearly explained, and written contracts must be drawn up. The military has shown itself very efficient in afforestation activities and can well be employed, especially in mountainous and arid areas where the normal population is sparse.

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Extracts From a Speech by Liu P'ei-chih at the 1951 Forestry Conference

The area of 8,600,000 hectares included in the original West Manchuria Protective Afforestation Belt included 2,200,000 hectares of cultivated land, 4,300,000 hectares of wild land, 540,000 hectares of alkali land, 300,000 hectares of swamp land, 820,000 hectares of sand hills, 60,000 hectares of desert, 46,000 hectares of mountainous land, and 9,000 hectares of forest. The area marked for afforestation was 1,010,000 hectares.

Later, 39 hsiens were added as follows:

	<u>No of Hsiens</u>
Heilungkiang	11
Inner Mongolia	3
Jehol	4
Kirin	3
Liaosi	11
Liaotung	6
Lu-ta Municipality	1

This addition makes a total of 60 hsiens and banners included in the total program of both antisand and antitide protection. It includes about one third of the hsiens of the Northeast, with a total area of about 20 million hectares. Actual afforestation will cover about 3 million hectares. About 20 percent of the area of the Northeast is involved in the program. The timing of the project has been cut from 12 to 6 years.

The afforestation area will extend 1,100 kilometers from Shan-hai-kuan in the south to Kan-nan and Fu-yu hsiens in Heilungkiang in the north. It will reach a maximum width of 300 kilometers. It is expected that the agricultural productivity of 1,800,000 hectares will be increased by 30 percent and that 1,800,000 hectares of unproductive land can be reclaimed. It is estimated that after 15 years, the value of new timber becoming available will equal the value of 40 million tons of grain.

In the propagation of saplings for this project, the propagation plots should be developed in the neighborhood of the afforestation area so that they will be suited to the soil and acclimated when they are transplanted.

The most serious problems facing the program are lack of technicians and cadres, survival of transplants, and costs.

Rainy Season Afforestation Experience

In North China, in the short summer rainy season of about one month, the saplings of fast-growing trees may be set out. These include pine, cypress, elm, locust, poplar, and date [Jujube]. Cuttings of poplar, willow, and reeds will do well.

Root cuttings of ash, date, ailanthus, elm, poplar, and reeds will also do well. Seeds of ts'e-pai (*Thuja orientalis* L.), pine, cypress, ash, ailanthus, thorn, purple spiked locust, elm, and willow are quick-sprouting. Peach, apricot, and walnut are also very satisfactory.

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The setting aside of special publicly operated nursery areas in most of China proper where the population is dense would result in hardship for the people, nor is the government at present able to undertake such projects. Hence the best way is to support private nurseries already in existence with advice, funds, seeds, sales outlets, etc.

3. Problems of Planning

This 1951 being the first year of national forestry planning, many faulty practices by forestry workers are appearing. These can lead to the annoyance and antagonism of the masses and local authorities. Hence, in the future, it will be essential to observe the following points:

- a. Careful preliminary research on such problems as best locations, seed plots, and available mass labor force.
- b. Mass afforestation planning and the people's individual forestry activities must be kept segregated.
- c. Plans laid must be submitted for discussion to production conferences on all levels, from province to village, so that all levels of authorities and the people may adopt the plans as their own.
- d. Frequent inspection of the way the plans are being carried out is necessary to correct quickly any deviations.

4. Forest Protection

While forestry protection has been basically strengthened this year 1951, there are still heavy losses. To eliminate these further the following points must be observed:

- a. All authorities must regard forest protection as a definite practical measure.
- b. All authorities must rigorously carry out punishments for destruction of forests and reward those who protect forests. These actions must be publicized.
- c. Patriotic forestry pacts should include the three factors of reward, punishment, and education. Actions on these factors are carried out on the hsien level, according to the correct procedures.

5. Development of Technical Cadres

All provinces are calling on the Ministry of Forestry for technicians. However, the forestry departments of all the universities in the country only turned out 100 graduates in 1951. Shantung alone is asking for 300 technicians. The best immediate solution the Ministry of Forestry has to offer is for each province to conduct training courses. If each province trained 100 men a year, several thousand technicians would soon be available.

6. Carry Out Afforestation in the Rainy Season

Experience has demonstrated that in North China the rainy season is preferable to the spring season for afforestation. This idea should be promoted in the whole region, and a goal of accomplishing at least 20 percent of the year's goal during that season should be set.

While in general, for the country as a whole, spring is the most propitious time to begin the year's afforestation program, the rainy season in some areas may be the most profitable. In North China, survival rate for trees planted in spring runs from 70 to 80 percent and 80 to 90 percent for those planted during the rainy season.

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Early rainfall records for the upper reaches of the Yung-ting Ho in Chahar are sketchy. There is a record of 129.5 millimeter's precipitation in one 24-hour period at Ta-t'ung in 1922 and 109 millimeter at Wei Hsien in 1924; however, these figures are not too reliable.

On a personal observation tour during the rainy season, from 11 July to 3 September 1950, the observer not identified found that most of the rainfall consisted of showers of a few minutes' duration, seldom more than 20 minutes and only twice lasting for as much as 2 hours. This type of heavy, concentrated shower results in much washing of the mountain slopes. Another important factor in the climate of this area is the incessant winds that blow from September to May, blowing away much of the topsoil.

The upper reaches of the Yung-ting Ho above Huai-lai and Kuan-ting embrace an area of 42,120-47,000 square kilometers. A main tributary, the Sang-kan Ho, is 350 kilometers long above Chu-kuan-t'un in Huai-lai Hsien. It has some 13 large and small tributaries, embracing a drainage area of 23,440-28,000 square kilometers. The Yang Ho above Hsian-hua-yuan is 170 kilometers long, with 18 tributaries and a drainage area of 14,520-17,000 square kilometers.

The annual rainfall in the area is from 300-500 millimeters. The evaporation rate is 1,300-2,000 millimeters, that is, from two to five times the precipitation rate. The total annual precipitation on the 47,000 square kilometers of the upper reaches of the Yung-ting Ho is estimated at 17,200,000,000 cubic meters and the runoff, 1,400,000,000 cubic meters, or 82 percent of the precipitation. While this estimate is the result of several years' cumulative statistics, it is subject to critical review. The annual precipitation and evaporation of a given place cannot be constructed on the annual average alone. For instance, in Ching-chia-k'ou Kalgan, in April 1947, precipitation was 0.7 millimeter, while evaporation was 219.8 millimeters, 310 times the precipitation; in May, precipitation was 25.4 millimeters, evaporation 247.9, or about ten times the precipitation; in June, precipitation was 45.2 millimeters, evaporation 267.9, or six times the precipitation. In July, precipitation was 98.8 millimeters, evaporation 287.9, or about 2.9 times the precipitation. In August, precipitation was 164.8 millimeters, evaporation, 204.6, or 1.4 times the precipitation. A study of the data reveals that the rainfall in July occurred during a total of 27 hours and that of August, during 50 hours. It is also apparent that the rainfall is spotty, and the statistics of one place cannot be considered representative of the whole area. The grade of the river bed Yung-ting Ho ranges from 10 percent to 0.05-0.06 percent. The flood period runs from 6 or 7 hours to a whole night and day. The width of the stream may range from several tens of meters to 6 or 7 kilometers.

The maximum and minimum flow rate and percentage of silt carried is given below.

Stream	Flow Rate (cu m/sec)		Silt (%)	
	High	Low	High	Low
Yung-ting Ho	3,230	0.8	36.55	0.02
Yang Ho	5,000	1.62	12	0.81
Sang-kan Ho	1,600	3	2	0.39
Yu Ho	1,100	21		
Hun Ho	750	3		

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During flood tide, the Yung-ting Ho carries 6,866,000 tons of silt per hour, according to the 1950 edition of Shui-t'u Pao-ch'ih (Soil Conservation) page 26, or approximately 50 million tons per year. The farmers of the area are thus made that much poorer each year.

According to actual surveys of wind speeds made at To-lun in 1949 the greatest speed is on peaks, the next is on lee slopes [sic] of mountains, the third is on level plains, and the least is in garden plots sheltered by trees.

An actual test made of the effect of protective forest belts on wind speed on 21 September 1949 revealed the following facts:

On the windward side, in the open, the wind speed was 4 meters per second. In the woods, on the windward side, the speed was 1.2 meters per second. Deeper in the woods, there was no wind. Just outside the woods, on the lee side, the speed was one meter. Ten meters outside the grove, it was 1.1 meter. Twenty meters away, the speed was 1.3 meters. At 50 meters' distance, it was 4 meters. In unforested areas, the wind speed was 6.5 meters per second. It is thus evident that protective forest belts do have a significant effect on wind movement.

General Forest Areas

In Chahar, forests occupy only about 1.4 percent of the area of the province. Birch is the most common tree in the northern part of the province, with a few willows and Shu-li (*Rhamnus japonica*, Maxim.) in other parts. So-called forested mountains have only a few scattered clumps of trees on their slopes.

There is some red pine (*Pinus densiflora*, S et Z) in the upper reaches of the Yung-ting Ho, usually in mixture with other types.

In China as a whole, red pine is found in approximately the following quantities:

<u>Area</u>	<u>Quantity (cu m)</u>
Southwest	2,000
Central China	1,500-1,800
North China	1,300-1,500
Northeast	50-700

In the valley of the San-kan Ho, there are some groves of red pine running from 6.5 meters high, with from 29 to 32 annual growth rings, and with a circumference of around 40 centimeters. In the sand hills south of To-lun there is evidence of former red pine groves. The groves are found at elevations of around 1,300 meters. In these groves, loam is upward of 40 centimeters deep.

Timber distribution by elevation in the area of Ta-hu-t'ou is as follows:

<u>Types</u>	<u>Elevation (meters)</u>
Deciduous pine and birch	2,000-7,300
Cypress and birch	1,800-2,000
Pine	1,300-1,800
Red pine (abundant)	1,300-1,500

It is apparent that in most of the upper reaches of the Yung-ting Ho, red pine can be cultured.

Deciduous pine makes good construction timber. It appears in various parts of the country at various levels in various regions:

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<u>Region</u>	<u>Elevation (meters)</u>
Southwest (Yunnan)	3,800-4,500
Southwest (Szechwan)	2,700-3,800
Central China	2,600-2,900
North China (upper Yung-ting Ho and North Hopeh)	1,800-2,200
Northeast	500-700 (Hsiao pai shan) 0-500 (Heilungkiang)

In a representative stand of deciduous pine in Hun-yuan Hsien, in an area of 400 square meters, were found the following: larger trees (57 centimeters in circumference), 121; medium (39 centimeters in circumference), 89; and small (11 centimeters in circumference), 172. Thirty-nine-year-old large trees were 14.1 meters high and 18 centimeters in diameter; medium trees were 18 years old, 5 meters high, and 17 centimeters in diameter. The ratio of height to diameter for the standard tree is 100 to one. Humidity in the forests is 38 percent; outside the forests, 50 percent. In the high, cold mountains of the Northeast, the deciduous pine is a good type to propagate. It endures both cold and snow, wind and sand, and dampness.

In the Hsiao-wu-t'ai Shan, timber distribution is as follows:

<u>Types</u>	<u>Elevation (meters)</u>
Grass	2,260-2,700
Deciduous pine and birch	2,000-2,300
Birch and cypress (yun-shan)	1,800-2,000
Red pine	Below 1,800

In the Northwest, at elevations of from 1,800 to 2,200 meters, deciduous pine could be easily propagated on a large scale. There is evidence that in the past, these areas were well covered with deciduous pine.

In the upper reaches of the Yung-ting Ho, there are found a number of varieties of fir or cypress (*Cunninghamia sinensis*) and *Cryptomeria japonica* Don scattered among the deciduous pine and birch; no separate groves have been observed.

Afforestation as an Antisand Weapon in the Northwest

Sand willow, sand artemisia, fragrant pine, tree willow, green poplar, and small-leaf poplar are recommended as desert-conquering trees.

Desert in North Shensi Can Be Conquered

A campaign is under way to change the desert into a green landscape by using military and volunteer mass labor to set out willow cuttings. The rate of survival is 75-90 percent. This program will proceed from planting sand-combating types to economically exploitable types and then to the controlled harvesting of these economically exploitable types and promotion of grazing and agriculture.

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